

Cluster Performance Enhancements High-Intensity Retreat (CPEHIR), Cloudcroft, New Mexico*

Neil Pundit[†] Rolf Riesen[‡]

September 3 - September 5, 2002

1 Welcome

The goal of this retreat is to generate and discuss ideas to enhance performance of scientific clusters. We are concentrating on enhancements to systems software that improve the performance for our users. Improvements can be in the operating system, the libraries, the runtime system, or the system management software. We are looking for ideas that

- Improve the execution time of applications
- Let a system process more jobs in a given time
- Make system management and maintenance easier
- Increase uptime

and other performance related improvements.

We will have short presentations of ideas and then longer discussions and brainstorming sessions to improve on the presented ideas or generate new ideas. The final outcome of the retreat is a list of ideas for research and development that enhances some performance aspect of scientific clusters.

The retreat is held in a remote location and we are using a unique format to keep distractions to a minimum. Expect to think and work hard during the high-intensity sessions. There will be plenty of time between the sessions to relax, recover, and enjoy the amenities which the hotel and the area have to offer.

*Sponsored by the Computer Science Research Institute (CSRI), Sandia National Laboratories.

[†]Host, ndpundi@sandia.gov

[‡]Technical Chair, rolf@cs.sandia.gov

2 Invitation

This retreat is by invitation only. The hotel we have chosen is fairly small, but more importantly, we want to keep the group size to about thirty people. We want to give all participants the opportunity to actively contribute to the goals of this retreat. Discussions will be lively, and the format requires a lot of interactions. We want to hear from people with different ideas. We are trying to invite a limited number of people from each institution.

We are seeking ideas that have not been implemented before. Either because nobody has thought of them, there has not been time, it is too early, or the potential benefits may not materialize. The less well formed and the less specific, the better suited the idea is for this retreat. The participants will discuss the ideas and shape the direction of future research and development. We are looking for seeds and ideas to be refined through discussions with your colleagues.

Let us explore and investigate ideas that enhance performance in some way. Think of an idea that you can present briefly and that is likely to spark animated discussions and other ideas.

3 Format

The format of this retreat is somewhat unique. We want to have highly intense sessions with a high level of participation and collaboration for all attendees. We want everybody to concentrate and stay focused. All invitees are expected to present one or more ideas and participate actively in all discussions.

We will keep distractions to a minimum and allow for plenty of time between the sessions to recover and relax (have a look at the agenda).

During the sessions PDAs, cell phones, and pagers are unwanted in the meeting room. Laptops should be turned off and put away except to make a presentation or to capture summaries for a subsequent presentation. We want to think about the goals at hand and not be distracted by electronic gadgets. Prepare your short presentation beforehand, or use markers and overhead transparencies to make your point.

Everybody will be given ample time at the beginning of the retreat to introduce themselves and let us know a little bit about their interests and goals. Over the two days each attendee will present their ideas in a short five to ten minute presentation. Remember, we are interested in ideas, not yet another introduction to cluster X and how much better it is than cluster Y. Also, ideas and contribution to ideas are important, not the quality of your PowerPoint slides. Handwritten slides are encouraged!

For each idea presented, we will go through five phases:

- Idea presentation. No more than 5 to 10 minutes
- Q&A for clarification

- Discussion of positive aspects of the idea, possible enhancements, related ideas, etc.
- A short discussion of potential drawbacks
- Writing a summary of the ideas and discussions

During the initial discussion of an idea only positive aspects should be mentioned. Nothing discourages the growth of an idea more than negative remarks. We will become more realistic in the fourth phase of each idea discussion and briefly think about potential problems with the idea. We will then summarize the idea and the discussions we had and try to finish in a positive state of mind before we go on to the presentation of the next idea.

We want this retreat to be a positive experience for everybody and want to create an environment that encourages the expression of novel ideas. The goal is for all of us to participate in generating ideas and making them better.

Our ideas on how to accomplish this and keep the sessions most productive are still forming. Maybe there needs to be more time between the presentation of an idea and the discussion of it. Feel free to send suggestions on how we can stay focused and have everybody participate to rolf@cs.sandia.gov.

4 Agenda

Our agenda has a large block of time allocated during the middle of the day for an activity break. This time is intended for you to catch up with e-mail and phone calls, have lunch, and relax. Visit some of the attractions listed in the “links” section below, go on a stroll, or use the recreational facilities available at The Lodge.

Use the activity break to enjoy the remote, high altitude New Mexico National Forest and recuperate for another high intensity session in the late afternoon.

Tuesday, September 3, 2002	
7:00 pm - 9:00 pm	Registration and Reception (hors d'oeuvres, cash bar)
Wednesday, September 4, 2002	
7:30 am - 8:30 am	Breakfast: Large country buffet
8:30 am - 10:00 am	Session I. Chair: Rolf Riesen, Sandia National Laboratories Neil Pundit: Welcome Rolf Riesen: Organization Everybody: Introductions Presenters: Thomas Christopher, Sandia National Laboratories Tramm Hudson, Rotomotion
10:00 am - 10:20 am	Break with refreshments
10:20 am - 11:30 am	Session II. Chair: Arthur B. Maccabe, University of New Mexico Presenters: Ron Brightwell, Sandia National Laboratories Patrick Geoffray, Myricom
11:30 am - 4:00 pm	Lunch (on your own) and activity break
4:00 pm - 5:30 pm	Session III. Chair: Neil Pundit, Sandia National Laboratories Presenters: Dan Reed, National Center for Supercomputing Applications Pete Wyckoff, Ohio Supercomputing Center Kim Yates, Lawrence Livermore National Laboratory
5:30 pm - 5:50 pm	Break with refreshments
5:50 pm - 7:30 pm	Session IV. Chair: Sanjay (L.V.) Kale, UIUC Presenters: Robert A. Ballance, HPCERC Vitus Leung, Sandia National Laboratories John Noe, Sandia National Laboratories Nathan Stone, Pittsburgh Supercomputing Center
7:30 pm - 8:00 pm	Social
8:00 pm - 9:30 pm	Dinner: The Lodge buffet

Thursday, September 5, 2002

7:30 am - 8:30 am	Breakfast: Southwestern buffet
8:30 am - 10:00 am	Session V. Chair: John Noe, Sandia National Laboratories
	Presenters: Ben Cole, Sandia National Laboratories Arthur B. Maccabe, University of New Mexico Mahesh Rajan, Sandia National Laboratories
10:00 am - 10:20 am	Break with refreshments
10:20 am - 11:30 am	Session VI. Chair: Thomas Sterling, Caltech
	Presenters: Brett Bode, Ames Laboratory Greg Lindahl, Key Research Todd Underwood, Oso Grande
11:30 am - 4:00 pm	Lunch (on your own) and activity break
4:00 pm - 5:30 pm	Session VII. Chair: Dan Reed, NCSA
	Presenters: Sanjay (L.V.) Kale, University of Illinois at Urbana-Champaign Kevin Pedretti, Sandia National Laboratories Thomas Sterling, Caltech
5:30 pm - 5:50 pm	Break with refreshments
5:50 pm - 7:30 pm	Session VIII. Chair: Nathan Stone, Pittsburgh Supercomputing Center
	Presenters: Narayan Desai, Argonne National Laboratory Jim Laros, Sandia National Laboratories Stephen Scott, Oak Ridge National Laboratory
	Everybody: Conclusions
7:30 pm - 8:00 pm	Social
8:00 pm - 9:30 pm	Dinner: Seafood buffet

5 Participants

Robert A. Ballance	HPCERC
Brett Bode	Ames Laboratory
Ron Brightwell	Sandia National Laboratories
Thomas Christopher	Sandia National Laboratories
Ben Cole	Sandia National Laboratories
Narayan Desai	Argonne National Laboratory
Patrick Geoffray	Myricom
Tramm Hudson	Rotomotion
Sanjay (L.V.) Kale	University of Illinois at Urbana-Champaign
Jim Laros	Sandia National Laboratories
Vitus Leung	Sandia National Laboratories
Greg Lindahl	Key Research
Arthur B. Maccabe	University of New Mexico
John Noe	Sandia National Laboratories
Kevin Pedretti	Sandia National Laboratories
Neil Pundit	Sandia National Laboratories
Mahesh Rajan	Sandia National Laboratories
Dan Reed	National Center for Supercomputing Applications
Rolf Riesen	Sandia National Laboratories
Stephen Scott	Oak Ridge National Laboratory
Thomas Sterling	Caltech
Nathan Stone	Pittsburgh Supercomputing Center
Todd Underwood	Oso Grande
Pete Wyckoff	Ohio Supercomputing Center
Kim Yates	Lawrence Livermore National Laboratory

6 Links

The location of this retreat is The Lodge <http://www.thelodge-nm.com/> in Cloudcroft, New Mexico. It was constructed in 1899 by the Alamogordo and Sacramento Mountain Railway. This historic building is located high in the mountains and surrounded by the Lincoln National Forest. Complete with its own ghost, one of the highest golf courses in America (9,000 feet above sea level), and an exquisite restaurant, The Lodge makes a perfect retreat to relax and concentrate.

Cloudcroft <http://www.cloudcroft.net> is the astronomy capital of New Mexico. The high elevation and the crystal clear, dark skies provide excellent opportunities for stargazing. Bring your telescope or at least a pair of binoculars. There are also bed and breakfast places which come equipped with astronomical equipment. For example New Mexico Skies <http://www.nmskies.com>.

High on top of the Sacramento mountains, overlooking the Tularosa basin with White Sands National Monument below, is the Sunspot Solar Observatory <http://www.sunspot.noao.edu>. The observatory is open to daytime visitors

and provides interesting information and equipment to look at related to our closest star.

Also at Sunspot, New Mexico, is the Apache Point Observatory <http://www.apo.nmsu.edu>. Among other things, the Sloan Digital Sky Survey <http://www.sdss.org> is conducted here.

Cloudcroft <http://www.cloudcroft.net> is located in the heart of Lincoln National Forest <http://www.fs.fed.us/r3/lincoln>. Many outdoor activities are available. Bring your hiking boots! Additional information about Cloudcroft is available here <http://www.cloudcroft.com>.

A short drive down the mountain, lets you visit White Sands National Monument <http://www.nps.gov/whsa>, an area of 275 square miles of desert covered with dunes of gypsum sand. The brilliant white dunes are an interesting place to visit and to learn more about life's adaptation to extremely harsh environments.

The Space Center <http://www.zianet.com/space> and the Clyde W. Tombaugh (discoverer of Pluto) Planetarium & IMAX Dome Theater <http://www.spacefame.org/plan.html> in Alamogordo <http://www.alamogordo.com> are places to go if technology and space science are of interest to you.

If gambling is your thing, the casino <http://www.innofthemountaingods.com/casino.htm> at the Inn of the Mountain Gods is also close by.

A scenic drive through the Mescalero Apache reservation takes you to Ruidoso. The horse races there and the Museum of the Horse <http://www.zianet.com/museum> (now The Hubbard Museum of the American West) are popular attractions. A short trip further leads to Capitan, the burial site of the original Smokey Bear.